Wide-QRS tachycardia immediately after aortic valve replacement

D. Luke Glancy, MD

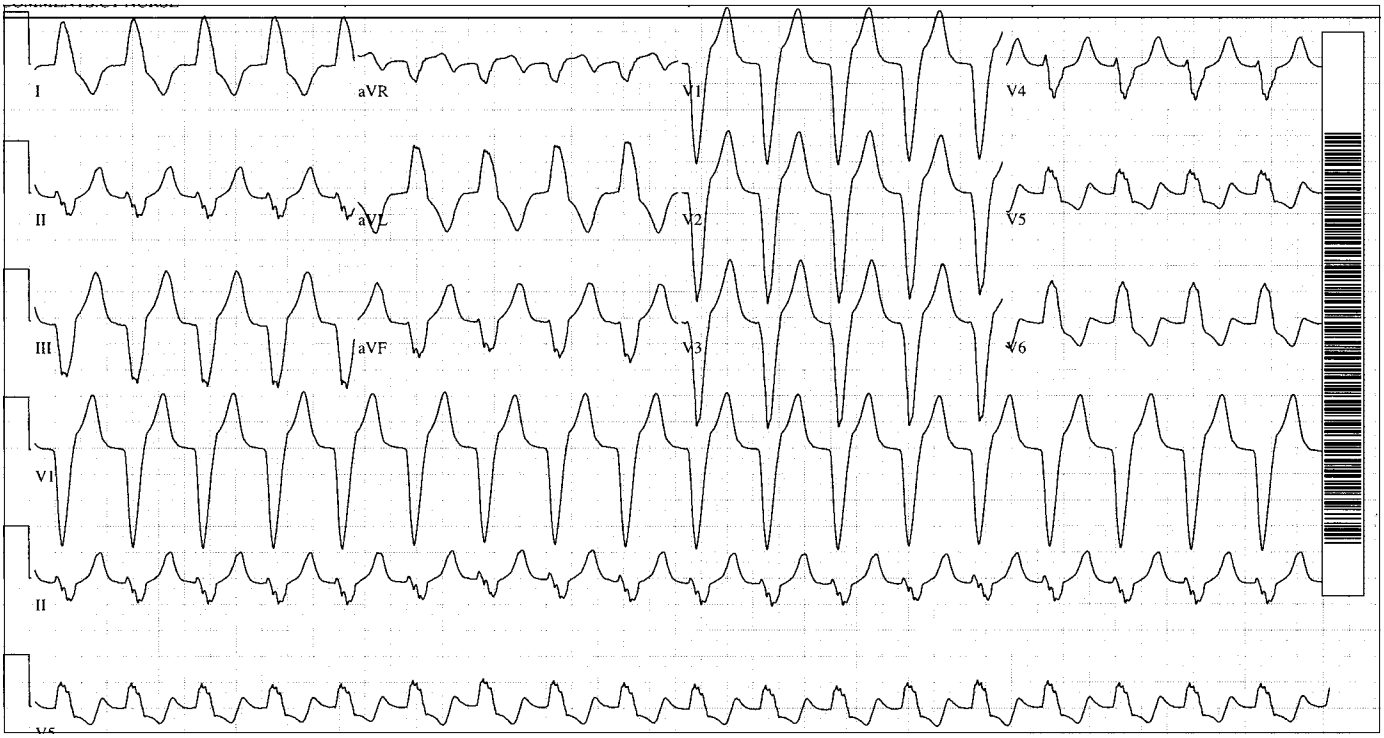

Figure 1. Electrocardiogram recorded immediately after aortic valve replacement. See text for explication.

A 49-year-old man with morbid obesity (6′5″, 360 lbs), diabetes mellitus, hypercholesterolemia, and a history of systemic arterial hypertension had an aortic valve replacement for severe stenosis (aortic valve area, 0.9 cm^2) with exertional dyspnea and left ventricular hypertrophy on echocardiogram. Immediately after operation an electrocardiogram was recorded *(Figure 1).* The electrocardiogram shows a regular tachycardia at a rate of 110 beats/min with a wide QRS (0.17 s duration) and a left-bundle-branch-block configuration: broad and notched or slurred R waves are present in leads aVL, V_5, V_6 without Q waves in these leads, and the peak of the R wave in lead V_6 is prolonged to 0.07 s (1). In addition, wide QS waves in leads V_1, V_2 have a time from the onset of the QS to the nadir of 0.06 s and no notch on the downslope of the QS (2). No definite P waves are visible.

Is this ventricular tachycardia or a supraventricular tachycardia with left bundle branch block? If the latter, what kind of supraventricular tachycardia is it? A preoperative electrocardiogram did not show left bundle branch block but did show a long P-R interval and left ventricular hypertrophy *(Figure 2)* (3).

Although ventricular tachycardias often have QRSs resembling left bundle branch block, the morphology rarely is typical (2). Thus, the perfect left bundle branch block in this patient suggests a supraventricular tachycardia with the new onset of left bundle branch block, which could be rate related and/or due to temporary or permanent damage to the left bundle branch during removal of the patient's heavily calcified bicuspid aortic valve and its replacement with a 29-mm St. Jude mechanical prosthesis.

From the Sections of Cardiology, Departments of Medicine, Louisiana State University Health Sciences Center and the Medical Center of Louisiana, New Orleans.

Corresponding author: D. Luke Glancy, MD, 7300 Lakeshore Drive, #30, New Orleans, Louisiana 70124 (e-mail: dglanc@lsuhsc.edu).

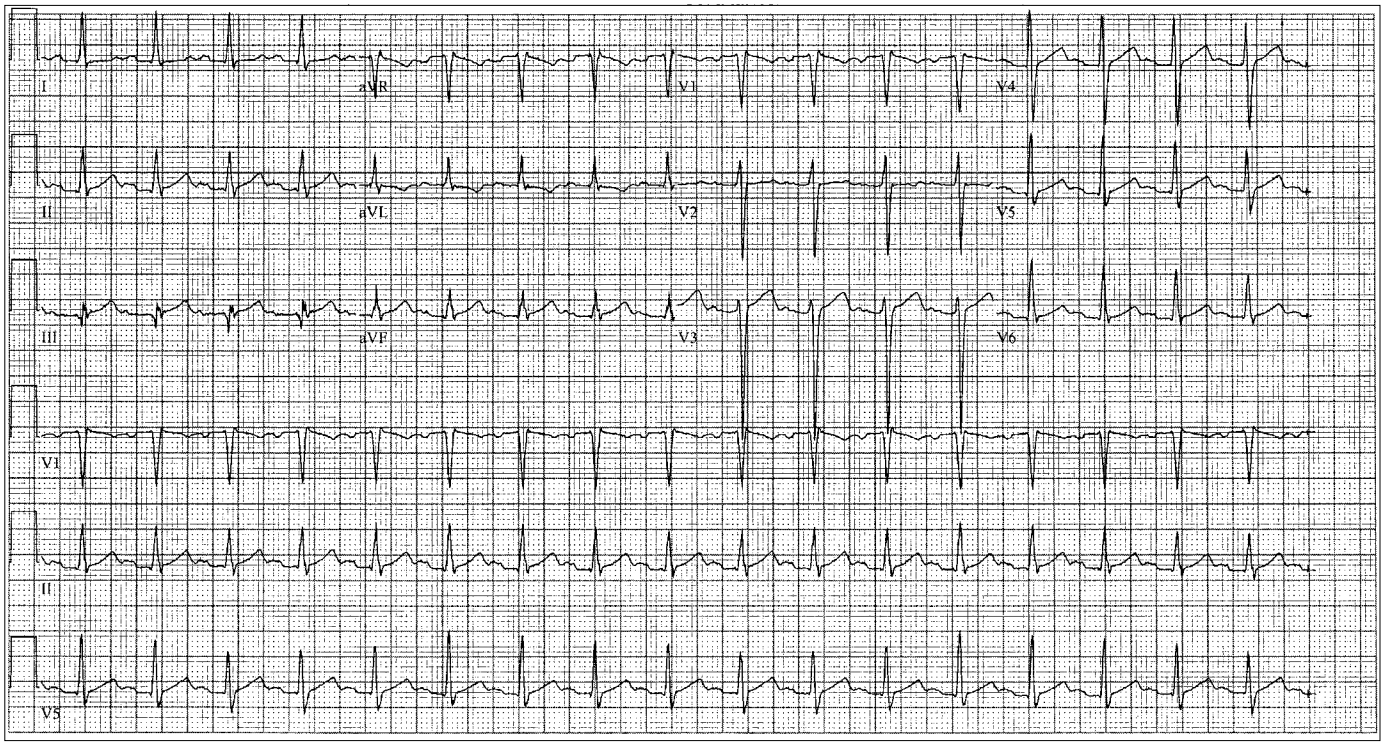

Figure 2. The last preoperative electrocardiogram before aortic valve replacement was recorded 3 weeks before operation. It showed sinus rhythm at a rate of 99 beats/min, a long P-R interval (0.23 s), a QRS duration at the upper limit of normal (0.11 s), and QRS voltage of left ventricular hypertrophy (SV_3 + RaVL, 30 mm or 3.0 mV; reference, <29 mm or 2.9 mV) (3).

The most common regular supraventricular tachycardia, especially at a rate of 110 beats/min, is sinus tachycardia, and because of a long P-R interval, the sinus P waves are buried in the preceding T waves. This suspicion is confirmed by daily electrocardiograms that show progressive separation of the sinus P waves from the preceding T waves *(Figure 3).* Thus, in this and other patients, sinus tachycardia with new or old bundle branch block is the cause of a regular wide-QRS tachycardia that may masquerade as ventricular tachycardia.

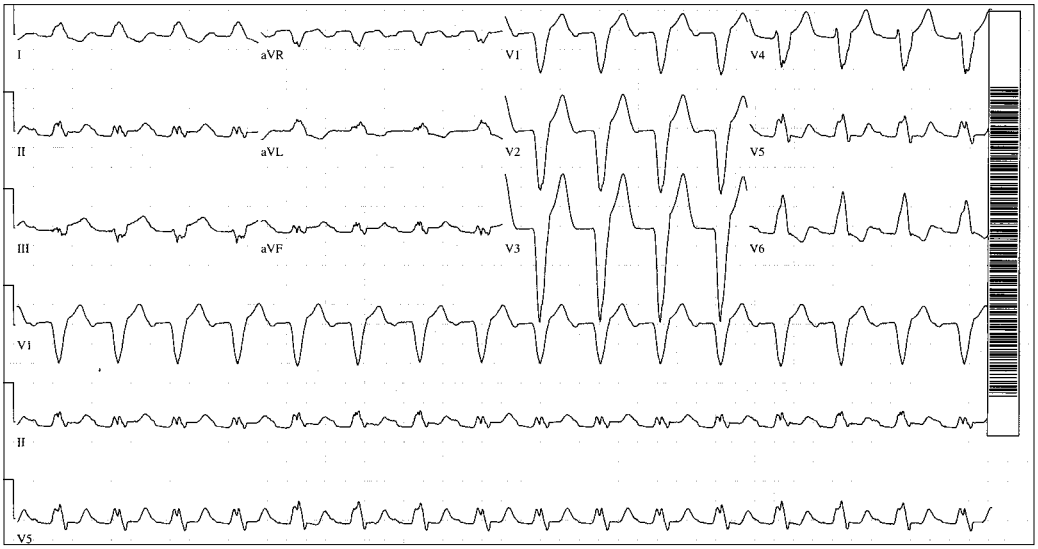

Figure 3. An electrocardiogram on the third postoperative day clearly shows sinus P waves as negative deflections at the end of the preceding T waves in lead V_1 and as notches on the downslopes of the preceding T waves in lead II. The P-R interval remains long (0.24 s), but slowing of the sinus rate to 97 beats/min allows partial separation of the P waves from the preceding T waves.

1. Willems JL, Robles de Medina EO, Bernard R, Coumel P, Fisch C, Krikler D, Mazur NA, Meijler FL, Morgensen L, Moret P, Pisa Z, Rautaharju PM, Surawicz B, Watanabe Y, Wellens HJJ, World Health Organization/International Society and Federation for Cardiology Task Force Ad Hoc. Criteria for intraventricular conduction disturbances and pre-excitation. *J Am Coll Cardiol* 1985;5(6):1261–1275.
2. Kindwall KE, Brown J, Josephson ME. Electrocardiographic criteria for ventricular tachycardia in wide complex left bundle branch block morphology tachycardias. *Am J Cardiol* 1988;61(15):1279–1283.
3. Casale PN, Devereux RB, Alonso DR, Campo E, Kligfield P. Improved sex-specific criteria of left ventricular hypertrophy for clinical and computer interpretation of electrocardiograms: validation with autopsy findings. *Circulation* 1987;75(3):565–572.